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Pesticide Fact Sheet Number 208: MCPA

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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EPA

Pesticide Fact Sheet

540/FS-89-070

Name of Chemical: MCPA

Reason for Issuance: REGISTRATION STANDARD (SRR)

Date Issued: SEP 22 1989

Fact Sheet Number: 208

1. Description of Chemical

Generic name: 2-methyl-4-chlorophenoxyacetic acid, and its sodium salt, esters and organic amines

Common name: MCPA

Trade names: ACME MCPA AMINE 4, AGRITOX, AGRO ONE, BORDERMASTER, BH MCPA, CHIPTOX, DED-WEED, EMPAL, KILSEM, MEPHANAL, METHOXONE, PHOMENE, RHONOX, and WEEDAR

EPA Pesticide Chemical (Shaughnessy) Number:

MCPA acid - 030501
Sodium salt - 030502
Diethanolamine salt - 030511
Dimethylamine salt - 030516
Butoxyethyl Ester - 030553
Isobutyl Ester - 030562
Isooctyl Ester - 030563
Isopropyl Ester - 030566

Chemical Abstracts Service (CAS) Number:

MCPA acid - 94-74-6

Year of Initial Registration: 1973

Pesticide Type: Herbicide

Chemical Family: Phenoxy herbicides

U.S. Registrant: Dow Chemical

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2. Use Patterns and Formulations

Application sites: Terrestrial food crop use on small grains (wheat, oats, barley, rye), peas, beans, pasture grasses, grain sorghum, alfalfa and clovers.

Terrestrial nonfood crop use on homelawns, ornamental turf, flax, grass seed crops, noncrop areas, pasture grasses, rangeland grasses, and forestry.

Aquatic food use on rice.

Aquatic nonfood use on aquatic weeds.

Formulations: Granular (MCPA acid and isooctyl ester); soluble concentrate/liquid (sodium salt, diethanolamine salt, dimethylamine salt); Technical (MCPA acid, Butoxyethyl ester, isooctyl ester); Formulation Intermediate (Butyl ester, isobutyl ester, isopropyl ester, dimethylamine salt, MCPA acid); Ready-To-Use (Dimethylamine salt); and Emulsifiable Concentrate (Butoxyethyl ester, isooctyl ester). There are 117 federally registered products containing MCPA as an active ingredient either by itself or itself or in combination with other pesticides.

Methods of application: Aerial and ground equipment, knapsack sprayers, pressure and hose-end applicators, and lawn spreaders.

Application rates: 0.2 - 3.0 lb active ingredient per acre.

Mode of activity: MCPA is absorbed through both leaves and roots and is readily translocated throughout the plant. MCPA stimulates nucleic acid and protein synthesis affecting the activity of enzymes, respiration and cell division. Broadleaf plants exhibit malformed leaves, stems and roots.

3. Science Findings

This review of MCPA acid, its salts, and esters, is the second intensive evaluation of the compound. In its original Registration Standard, issued in 1982, the Agency summarized the available data supporting the registration of MCPA and concluded that additional data were needed to fully evaluate the pesticide. The Agency has since received and reviewed the data on these compounds.

The Agency has registered 9 salts, esters and amines of MCPA in addition to the acid. From a toxicological standpoint the acid and the sodium salt are essentially identical. The

registrants, however, must show that the other derivatives would be equivalent to MCPA acid under testing conditions. Otherwise, a complete set of data must be submitted on each derivative to support their continued registration. The following scientific assessment discusses the Agency's knowledge on MCPA acid. If the data refers to a derivative, the derivative is identified.

Chemical/Physical Characteristics of the Technical Material

MCPA is white to light brown and can be a solid, flakes, crystal powder or liquid. It has no odor or can be slightly phenolic smelling. The melting point is 114 to 119°C and is soluble to varying degrees in various solvents.

Toxicology Characteristics

Acute Oral. Toxicity Category III (LD_{50} 1.38 g/kg in male rats, 0.76 g/kg in female rats).

Acute Dermal. Toxicity Category III (LD_{50} > 4000 mg/kg in the rat).

Acute Inhalation. Toxicity Category III (LC_{50} > 6.36 mg/L in the rat).

Primary Eye Irritation. Toxicity Category I (corneal opacity with irritation of conjunctive observed 21 days post-instillation with rabbits).

Skin Sensitization. Not a skin sensitizer in guinea pigs. Testing on other species required.

Acute Delayed Neurotoxicity. MCPA is not an organophosphate, therefore a study is not required.

Subchronic Oral. Sufficient data are available to satisfy the requirements of a subchronic oral study in rodents and nonrodents. In beagles there was evidence of dose-related liver and kidney toxicity. A NOEL for systemic effects was set at 1 mg/kg/day. In rats, the mid- and high-dose males exhibited increased kidney weights and both sexes had indications of kidney disfunction. Hepatotoxicity, based on prolongation of clotting times and decreased cholesterol concentrations occurred in high dose males. The NOEL for systemic effects is set at 2.5 mg/kg/day.

Subchronic Dermal. Data gap. A 21-day dermal toxicity study is required.

Chronic Toxicity. Sufficient data are available to satisfy the requirements for the chronic feeding studies in two species for technical MCPA acid. In beagles, after one year, kidney and liver toxicity was observed at the mid- and high dose levels. The systemic NOEL was set at 0.15 mg/kg/day, LDT.

In a 2 year rat study, hepatotoxicity was observed with elevated triglycerides, decreased cholesterol, and kidney nephropathy. The NOEL for systemic toxicity was set 1.0 mg/kg/day.

Oncogenicity. Rat and mouse studies were reviewed and found acceptable. MCPA is considered to be non-oncogenic. No additional studies are required.

Teratogenic. The studies available to the Agency are unacceptable under current guideline requirements. While these studies showed no developmental alterations, the Agency is requiring teratology studies in two species.

Reproduction. In a two-generation reproduction study with rats, there were indications of a potential postnatal growth effect. The NOEL is set at 7.5 mg/kg/day. No additional reproduction studies are required.

Mutagenicity. The Agency has data to satisfy the Structural Chromosomal Aberration study and the DNA Damage and Repair study. MCPA acid was found to be non-mutagenic in the first study and weakly mutagenic in the second. The Agency is requiring a gene mutation study.

Metabolism. In a rat study, MCPA did not appear to be significantly metabolized *in vivo* (82 and 88% were recovered in male and female rat urine, respectively). Repeat dosing did not generally indicate bioaccumulation in any site except the kidney, primarily in male rats. Fat appeared to be the site for some MCPA sequestration. No additional metabolism studies are required.

Special Neurotoxicity Testing. MCPA is structurally related to 2,4-D which is suspected of causing neuropathy in humans. Special neurotoxicity testing of 2,4-D is currently required. Because of this structural similarity to 2,4-D, the Agency is also requiring special neurotoxicity testing of MCPA.

Toxicology Profile of Other MCPA Formulations. As stated previously from a toxicological standpoint one may expect the acid and sodium salt to be identical. The organic

amines and esters may be significantly different and lacking data to show otherwise, may have different toxicological properties. The major exposure to these compounds is during application therefore acute toxicology data are required on the various derivatives. The Agency has some acute testing on these derivatives and they fall in toxicity Category III. Additional acute testing is required.

Human Exposure. The greatest potential for direct human exposure comes during mixing and loading operations. Exposure would be minimized by wearing of protective equipment. The Agency is requiring protective eyewear for mixers, loaders, and home users of MCPA acid products. No specialized protective language other than those required in 40 CFR 156 is required for other MCPA derivative homeowner use products. There have been no poisoning incidences with MCPA reported in California since 1974. Reentry data are not required since MCPA is generally in Toxicity Category III for acute studies.

Environmental Characteristics. Preliminary data have shown that MCPA degrades under aerobic laboratory conditions with a half-life of less than a week to 50 days. Under aerobic conditions 89% of parent MCPA remained undegraded for 374 days. MCPA is stable to hydrolysis and to photolysis in soils. MCPA salts are highly stable in water. Available data are insufficient to fully assess the environmental fate of MCPA and its various derivatives.

Groundwater Concerns. MCPA appears to be mobile from preliminary leaching studies. MCPA was found in well water in Missouri. Groundwater contamination appears to be associated with point sources. A special groundwater precautionary statement on labels is being imposed.

Ecological Effects

Based on available data, MCPA acid has been determined to be moderately toxic to avian species, slightly toxic to freshwater fish, practically nontoxic to freshwater invertebrates and estuarine and marine organisms. Additional ecological effects data are required on MCPA and its derivatives. The following data comes from acceptable studies:

- Acute LD_{50} 377 mg/kg for Bobwhite quail

- o Dietary LC_{50} > 2000 ppm for mallard, bobwhite, and ring-necked pheasant
- o LC_{50} rainbow trout = 89 ppm
- o LC_{50} bluegill = 97 ppm
- o LC_{50} Daphnids > 180 ppm
- o LC_{50} Atlantic silverside = 179 ppm
- o LC_{50} Oyster Larvae = 155 ppm

Effects on Plants. The Agency has no data for toxicity to nontarget plants. A complete battery of tests are required using MCPA and all its derivatives.

Potential Problems Related to Endangered Species. Because of MCPA's demonstrated toxicity to nontarget species and its intended use pattern, several endangered species could be put at risk from the application of MCPA acid and its derivatives. The Agency has proposed a comprehensive Endangered Species Protection program (Federal Register 54(126) July 3, 1989).

Nontarget Insects. MCPA acid and its sodium salt derivative are relatively nontoxic to honeybees. Data are required on the dimethylamine salt and isooctyl ester as their use patterns allow for significant potential exposure to bees.

Product Chemistry. The Agency is requiring that all product chemistry data be resubmitted. Further, MCPA may be contaminated with dioxins or dibenzofurans, and the amine salts of MCPA may be contaminated with n-nitrosamines. Therefore, analytical data are required for certain products.

Tolerance Assessment

Tolerances for residues of MCPA *per se* in or on food and feed commodities are published in 40 CFR 180.339(a). Tolerances for residues of MCPA and its metabolite 2-methyl-chlorophenoxyacetic acid in or on animal commodities are published in 40 CFR 180.339(b).

The residue data reviewed in support of these tolerances showed the following:

- Data on metabolism of MCPA in plants available for

review in the 1982 document indicated that MCPA is readily taken up and translocated by plants. Additional data are required on the identity and quantities of residue in or on plants. The nature of the residue is not adequately understood.

- Data pertaining to the residues of MCPA in animals were reviewed for the 1982 document. That document did not require additional data on animal metabolism. Current Guidelines specify that terminal residues in animals be identified and quantified using radioactive material. The metabolism of MCPA in animals is not adequately understood and additional data are required.

- The current residue analytical methods in PAM I are adequate for enforcement of tolerances for residues in plants and animals.

- Data depicting the stability of MCPA residues in storage were not required in the 1982 document. Current Guidelines specify that storage stability data must be submitted in support of established tolerances.

- There are available data to support the established tolerances for MCPA in or on canarygrass seed and straw.

- Additional residue data are required on dried beans, peas (succulent and dry), pea vines and hay, rice grain, sorghum grains, wheat grains, rice straw, sorghum forage and fodder, wheat straw, annual canarygrass, pasture and rangeland grasses, grass hay, alfalfa and alfalfa hay, flaxseed, and flax straw.

- The data requested on wheat grain, forage, and straw may, by translation, support the established tolerances for residues of MCPA in or on the grain, forage, and straw of barley, oats, and rye. The data requested on alfalfa and alfalfa hay may, by translation, support the established tolerances for residues of MCPA in or on clover and clover hay, lespedeza and lespedeza hay, trefoil and trefoil hay, and vetch and vetch hay.

- Processing data are needed on rice grain, sorghum grain, wheat grain, and flaxseed. The requirements for processing data on barley, oat, and rye grain may be satisfied by the data requested on wheat.

- Tolerances need to be proposed for residues of MCPA in or on bean vines and hay, barley hay, oat hay, rye hay, wheat forage and hay, and canarygrass forage.

- Upon receipt of the data requested on animal metabolism and livestock feed items, the established tolerances for the combined residues of MCPA and 2-methyl-4-chlorophenol in the meat, fat, and meat by-products of cattle, goats, hogs, horses, and sheep and in milk will be assessed and the need for tolerances for residues in poultry tissues and eggs will be determined.

- A provisional acceptable daily intake (PADI, RfD) of 0.0015 mg/kg/day for MCPA has been established based on a 1-year feeding study (dog, NOEL 0.15 mg/kg). The value given is a PADI because of the teratology data gaps. However, when the teratology studies are submitted and found acceptable, they are not expected to greatly alter the RfD calculations. A safety factor of 100 was utilized. The dietary exposure was calculated using the published tolerances in 40 CFR 180.339. A dietary exposure for the U.S. population is calculated to be 0.001547 mg/kg/day, corresponding to 103 percent of the RfD. The population subgroups with the highest calculated exposure were nonnursing infants (0.007405 mg/kg/day, 493% of the RfD) and children 1 to 6 years of age (0.004069 mg/kg/day, 271% of the RfD). A dietary exposure was also conducted using the published tolerances factored by the percent of crop treated with MCPA. The dietary exposure for the U.S. population is then 10% of the RfD, for nonnursing infants, 51% of the RfD, and for children 1 to 6 years of age, 27% of the RfD.

4. Summary of Regulatory Positions and Rationales

- MCPA is not a candidate for special review.

- MCPA does not meet the criteria for restricted use classification.

- Precautionary labeling is required to minimize any hazard to nontarget organisms.

- The Agency is requiring data on MCPA acid as well as its derivative amines and esters.

- A special groundwater warning statement is required on the label because of MCPA's potential to contaminate these waters.

- MCPA does not meet the criteria to require a reentry interval.

- The Agency will consider establishment of significant new food use tolerances for MCPA.

5. Required Unique Labeling

A. Groundwater Advisory Statements
B. Environmental Hazards Statement
C. Feeding and/or Grazing Restrictions
D. Protective Clothing Statement
E. Nontarget Species Precautionary Statements

6. Summary of Outstanding Data Requirements

	Timeframe Ranges
Toxicology	1 - 4 years
Environmental Fate/Exposure	1 - 4 years
Ecological Effects	2 years
Residue Chemistry	2 - 4 years
Product Chemistry	1 - 2 years

7. Contact Persons at EPA

Product Specific Inquiries:
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DISCLAIMER: The information in this Pesticide Fact Sheet is a summary only and is not be used to satisfy data requirements for pesticide registration and reregistration. The complete Reregistration Document for the pesticide may be obtained from the National Technical Information Service. Contact the Review Manager listed above for further information.